

Efficacy of prophylactic antibiotic usage to that of regular antibiotics usage in patients undergoing elective caesarean section

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Abstract

Background: Surgical site infections better prevented by parenteral antibiotic in sufficient doses generally should be given before the operation which helps to achieve the therapeutic drug level both in the blood and related tissue during the operation. Ceftriaxone, when administered together as a prophylaxis can fulfil the above criteria of a good antibiotic. **Aim:** This study was planned to assess the efficacy of prophylactic antibiotic usage to that of regular antibiotics usage in patients undergoing elective surgeries. **Material and methods:** A comparative Prospective study was conducted in the Department of obstetrics and gynaecology, Narayan Medical College and Hospital, Sasaram, Bihar, India from July 2018 to December 2019. Total 200 Patients for elective LSCS and BMI < 30 were include in this study. Group A - patients received injection Ceftriaxone 1gm. intravenous stat at the time of induction of anesthesia. Group B - patients received intravenous ampicillin and metronidazole for 1 day followed by oral for next 5 days. Temperature monitoring, vital signs, abdominal, perineal examinations were performed daily till 5-7 days. **Results:** Patients were randomly divided on alternate number basis, in 2 groups (Group A Ceftriaxone 1gm iv stat and Group B ampicillin and metronidazole for 5 days) each consisted of 100 patients. Mean age was 24.5±4.2 years in group A & 23.4±3.8 years in group B. BMI at the time of admission was 27.9±7.8 kg/m² & 28.8± 6.2 kg/m² in group A & B respectively. Mean duration of surgery was 45.8±6.8 min in group A & 46.1±5.4 in group B. Average blood loss was in groups A 645±70 & 670±75 in group B was comparable. Mean days of hospitalisation was 4.6±4.1 days & 5.4±3.1 days in group A & B respectively. History of previous laparotomy like LSCS, ectopic surgery, etc. was present in 42 & 36 patients from group A & B respectively. Fever was most common morbidity noted (Group A – 7& Group B -5) followed by urinary tract infection (Group A – 5 & Group B -7), wound infection, endometritis & early neonatal sepsis. Statistical difference between group A & B was non significant for all morbidities. **Conclusion:** We conclude that the single dose antibiotic prophylaxis is as effective as conventional multi dose antibiotic therapy.

Keywords: prophylactic antibiotic, caesarian delivery, ceftriaxone, ampicillin and metronidazole.

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Introduction

Women undergoing caesarean delivery (CD) are 5 to 20 fold greater risk of infection than women of vaginal delivery group. Infectious complications after CD are an important and substantial cause of maternal morbidity and increase in the hospital stay and cost of treatment [1]. Infectious complications following CD include fever, wound infection, endometritis, Urinary tract infection, and some serious complication like pelvic abscess, septic shock and septic pelvic vein thrombophlebitis. It has been proved that prophylactic single dose antibiotic is equally effective as compared to long term post-operative combination of antibiotics[2].The most important source of microorganisms responsible for post c-section infection is the genital tract, particularly if the membranes are ruptured. Infections are commonly polymicrobial and the pathogens commonly isolated are Ecoli, other gram negative aerobic rods, group b streptococcus, staphylococcus aureus and coagulase negative staphylococci, enterococcus faecalis, gardenerella vaginalis, anaerobes and genital mycoplasma[3,4]. The administration of antibiotics is not intended to sterilize tissues but to act as an adjunct to decrease the intra operative microbial load to a level which can be managed by host immune responses.The goal of antibiotic therapy is to achieve sufficient tissue level at the time of microbial contamination, and the

optimal agent should be long acting, inexpensive and have a low side effect profile[5,6].Antibiotic prophylaxis for women undergoing cesarean delivery has been proven to be beneficial in decreasing post cesarean delivery infectious morbidity both in high risk or low-risk patients [5].A single dose of antibiotics is as effective as multiple doses given peri-operatively, and the routine use of prophylactic antibiotics reduces the risk of infection by more than 50% from a baseline as high as 20-50%[7,8]. Broad spectrum antibiotics were associated with statistically significant reduction in surgical and non-surgical infection rates and endometritis compared to narrow range. Also, the length of the hospital stay was significantly shorter when broad spectrum antibiotics were used[8]. Ceftriaxone is a third-generation cephalosporin that has a much higher serum level to minimum inhibitory concentration ratio when compared with aminoglycosides. Ceftriaxone not only covers gram positive organisms but also shows an enhanced coverage of gram-negative organisms and some anaerobic coverage than the first- and second-generation cephalosporin [9].Ceftriaxone does not require any renal or hepatic dose adjustment and it can be safely administered during pregnancy and after delivery. Parenteral antibiotics should be continued until the patient is afebrile for 24-48 hours and if needed, patient should subsequently receive oral antibiotics to complete a 7-day course of therapy. Patients should be switched to antibiotics based on culture and sensitivities when available. Based on these backgrounds, this study was planned to compare the efficacy of prophylactic antibiotic usage, to that of regular antibiotics usage in

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patients undergoing elective major obstetrical and gynecological surgery.

Material and methods

A comparative Prospective study was conducted in the Department of Obstetrics and Gynaecology, Narayan Medical College and Hospital, Sasaram, Bihar, India from July 2018 to December 2019.

Methodology

Total 200 Patients for elective LSCS and BMI < 30 were include in this study. Women who had suspected hypersensitivity, cephalosporins Any co-existing diseases like diabetes mellitus, hypertension or cardiac problem ,Surgical procedure exceeding more than 90 minutes and if and blood loss was more than 1500ml were exclude from study. The technique, risks, benefits, results and associated complications of the procedure were discussed with all patients. All patients were informed regarding the study and their consent was obtained. Baseline assessment including vital signs, general physical, systemic and obstetric examination were performed. Routine blood (CBC, RBS, RFT) and urine analysis & if required urine culture and sensitivity, high vaginal swab culture and sensitivity were carried out. Patients were randomly divided in 2 groups (Group A and Group B) each consisted of 100 patients. Group A - patients received injection Ceftriaxone 1gm. intravenous stat at the time of induction of anesthesia. Group B - patients received intravenous ampicillin and metronidazole for 1 day followed by oral for next 5 days. Temperature monitoring, vital signs, abdominal, perineal examinations was performed daily till 5-7days. If body temperature was more than 101°F on 2 occasions 4 hours or more

apart, excluding the night of surgery, it was considered as febrile morbidity and appropriate investigations were performed including urine culture, blood culture, high vaginal swab culture before starting appropriate multi dose antibiotics. Wound was inspected for superficial or deep infection, any pus discharge, surgical site abscess formation, wound dehiscence, vault haematoma and pelvic abscess. At discharge, patients were instructed to contact if they have any signs and symptoms of infection. All patients were followed up to 3 months at monthly intervals.

Results

Patients were randomly divided on alternate number basis, in 2 groups (Group A Ceftriaxone 1gm iv stat and Group B ampicillin and metronidazole for 5 days) each consisted of 100 patients. Mean age was 24.5±4.2 years in group A & 23.4±3.8 years in group B. BMI at the time of admission was 27.9±7.8 kg/m² & 28.8± 6.2 kg/m² in group A & B respectively. Mean duration of surgery was 45.8±6.8 min in group A & 46.1±5.4 in group B. Average blood loss was in groups A 645±70 & 670±75 in group B was comparable. Mean days of hospitalisation was 4.6±4.1 days & 5.4±3.1 days in group A & B respectively. History of previous laparotomy like LSCS, ectopic surgery, etc. was present in 42 & 36 patients from group A & B respectively. Fever was most common morbidity noted (Group A – 7 & Group B -5) followed by urinary tract infection (Group A – 5 & Group B -7), wound infection, endometritis & early neonatal sepsis. Statistical difference between group A & B was non significant for all morbidities. One patient from each group required resuturing. No mortality was noted in present study.

Table 1. Demographic Profile of the Patients

Parameter	Group A	Group B
Mean age in years	24.5±4.2	23.4±3.8
BMI in kg/m ²	27.9±7.8	28.8± 6.2

Table 2. Characteristics of patients in two surgical groups

Characteristics of patients	Group A	Group B
Mean duration of surgery (min)	45.8±6.8	46.1±5.4
Mean blood loss (ml.)	645±70	670±75
Mean days of catheterisation	1.1	1.2
Mean days of hospitalisation (days)	4.6±4.1	5.4±3.1
History of previous laparotomy	42	36

Discussion

Appropriate choice of prophylactic antibiotics requires an understanding of the polymicrobial nature of the endogenous microflora each site[10]. There was no trial of antibiotic prophylaxis in low risk group worldwide, that is, the patient with aseptic surgery. They recommended the use of prophylactic antibiotic in high risk patients who have prosthetic implant, colorectal surgery etc. and also in those in whom the development of an infection might be associated with a catastrophic end result[11]. Post-caesarean section infection is associated with obesity, diabetes, immunosuppressive disorders, chorioamnionitis, rupture of membranes > 18 hours, corticosteroid therapy, staple suture wound closure, fewer prenatal care visits, repeat caesarean section, emergency caesarean section, length of surgery >60 minutes, a prolonged labour, excessive blood loss during labour, delivery, or surgery, and failure to follow proper steps for wound care after leaving the hospital. Across the globe, SSIs are associated with increased morbidity and mortality; sequelae include revision surgeries, poor quality of life, prolonged antibiotic treatment and rehabilitation, and associated lost work and productivity. Moreover, SSIs are associated with a substantial economic burden to the healthcare system as a result of increased length of hospital stay and increased risk of readmission[12]. Current strategies aimed at preventing SSIs include improved hygiene, aseptic surgical techniques, carrier screening, decolonization, application of antibiotics to the surgical site prior to wound closure, and intravenous antibiotic

prophylaxis[13]. At many institutes, prophylactic antibiotic was being administered after cord clamping, so that it did not reach the foetal circulation. Concerns of masking signs of sepsis in babies, developing resistance to antibiotics and masking organisms in blood culture because of the transplacental transfer of the drug was the main reason for administration of the drug after cord clamping. However, recent studies suggested that, giving the drug prior to skin incision would significantly decrease the incidence of maternal infection without causing harm to the baby[14,15]. Single dose antibiotic prophylaxis is well-established for abdominal and vaginal hysterectomy and cumulative metaanalysis data indicate the same. Perioperative antimicrobial prophylaxis has been advocated in surgical procedures, but recent guidelines and publications showed that single dose antibiotic prophylaxis is equally effective in clean, and clean contaminated surgical procedures [16]. Following elective surgery, wound infection in patients who receive perioperative antibiotics (within 3 hours following skin incision) occurs in 1.4% compared to 0.6% in those who receive antibiotics within the 2 hours before skin incision[16]. In present study, there was no significant difference between two groups, so single dose antibiotics is as effective as routine 5 days course. It reduces patient side effects, cost of treatment, staff work, etc. The administration of single dose antibiotic prophylaxis also reduces the load on the staff and decreased the costs, which is a good for low-resource settings and should be adopted if the cost has to be reduced[17]. A study for

evaluation of prophylactic antibiotic in Caesarean section by Ansari N et al[18] found fever episode in 4% of cases, Endometritis and wound infection in 2% cases. Mudholkar AS[19] not found any case of endometritis however wound infection episode was 0.93%. Similar findings fever was most common morbidity noted (Group A – 7 & Group B -5) followed by urinary tract infection (Group A – 5 & Group B -7), wound infection, endometritis & early neonatal sepsis. Pinto-Lopes R et al[20] in 2017 in his review article included 16 studies, involving 2695 women and no significant difference was observed between single dose and multiple dose antibiotic prophylaxis in the incidence of postpartum infectious morbidity, endometritis, and wound infection. A trend towards lower risk of urinary tract infection was seen with multiple dosing. Another randomized, non-blinding clinical trial of 500 eligible participants compared IV single dose of gentamicin (3 mg/kg) plus metronidazole (500 mg) 30-60 minutes prior to CS with same regimen prior to the operation but continued for 24 hours. Pre-operative single dose antibiotic prophylaxis for emergency caesarean showed a lower cumulative incidence of surgical-site infection, a reduced staff workload and a minimized medication cost compared to multiple doses till 24 hours[21].

Conclusion

We conclude that the single dose antibiotic prophylaxis is as effective as conventional multi dose antibiotic therapy. It is cost effective, antibiotic resistance of microorganisms can be prevented, reduces patient side effects, nursing staff work. Further knowledge of antibiotic susceptibility and resistant strains is to be considered while choosing antibiotic.

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